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EXAMINER	
DHINGRA, RAKESH KUMAR	
ART UNIT	**PAPER NUMBER**
1763	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/727,250	NAKATA ET AL.	
	Examiner	Art Unit	
	Rakesh K. Dhingra	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 03 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 March 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *24-32* is/are pending in the application.

4a) Of the above claim(s) *27* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☐ Claim(s) *24-26 and 28-32* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

Applicant's arguments with respect to claims 1-17 (new claims 24-32) have been considered but are moot in view of the new ground(s) of rejection as explained hereunder.

Applicant has cancelled claims 1-23 and added new claims 24-32 with amended limitations.

New references by Ishii et al (US patent No. 5,698,036) and Wu (US patent No. 6,114,811) have been found those when combined with Mabuchi et al (US patent No. 5,645,644) read on limitations of new independent claims 24, 25. Accordingly claims 24, 25 have been rejected under 35 USC 103 (a) as explained below. Claims 24, 25 have also been rejected under 35 USC 103 (a) as being unpatentable over Naoki in view of Yuichi et al and Mabuchi as explained below.

Further dependent claims 26, 28-32 have also been rejected under 35 USC 103 (a) as explained below.

New claim 27 does not belong to elected species 1 (Figures 1A-1D, 2) and has therefore been withdrawn (it belongs to species 8, Figures 11A, 11B).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 24, 25, 28, 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishii et al (US Patent No. 5,698,036) in view of Mabuchi et al (5,645,644).

Regarding Claims 24, 28: Ishii et al teach a plasma processing apparatus (Figures 11-13) for performing plasma processing, comprising an electromagnetic wave source 50 for generating electromagnetic waves, plural branched rectangular waveguides 76, a plurality of slots 60 formed in the rectangular waveguides and comprising a waveguide antenna, a electromagnetic wave radiation window 48 made of quartz (dielectric material), and a vacuum chamber 4, and configured such that a plasma is generated by the electromagnetic waves radiated from the slots into the vacuum chamber through the electromagnetic wave radiation window, wherein, the rectangular waveguides 76 are linear waveguides, provided in contact with the vacuum chamber, and arranged such that the adjacent waveguides are in contact with each other at their elongated side faces;

the plasma processing apparatus includes a linear rectangular waveguide tube (electromagnetic wave distributing waveguide) 70 directly communicating with ends of the plural rectangular waveguides at a sidewall surface thereof along a longitudinal direction of the electromagnetic wave distributing waveguide, the distributing waveguide having one end connected to the electromagnetic wave source 50, and distributing the electromagnetic waves from the electromagnetic wave source into the plural rectangular waveguides;

a transmission path of the electromagnetic waves is bent through substantially 90 degrees to the plurality of linear and rectangular waveguides 76 from the electromagnetic wave distributing waveguide 70; and

the electromagnetic wave distributing waveguide 70 and the plural rectangular waveguides 76 are arranged on substantially the same plane (column 10, line 10 to column 11, line 25).

Ishii et al do not explicitly teach plurality of windows that comprise part of a wall of the vacuum chamber 4 such that a vacuum can be maintained in the vacuum chamber.

Mabuchi et al teach a microwave plasma apparatus (Figures 2A, 2B) that includes a microwave source 24, a waveguide 23, a dielectric sheet 21 (like a distributing waveguide) and plurality of windows 4 that form parts of wall of a vacuum chamber 1 such that a vacuum can be maintained in the vacuum chamber (column 5, line 15 to column 6, line 30).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use plurality of windows that also seal the vacuum chamber as taught

by Mabuchi et al in the apparatus of Ishii et al avoid uneven dielectric heating of a larger window due to thermal strain (column 2, lines 5-25).

Regarding Claim 25: Ishii et al teach all limitations of the claim as explained above and also that each of the plural waveguides is branched from an electric field plane of the electromagnetic wave distributing waveguide.

Ishii et al do not teach plurality of rectangular windows provided on each rectangular waveguide that comprise part of a wall of the vacuum chamber 4 such that a vacuum can be maintained in the vacuum chamber.

Mabuchi et al teach a microwave plasma apparatus (Figures 2A, 2B) that includes a microwave source 24, a waveguide 23, a dielectric sheet 21 (like a distributing waveguide) and plurality of rectangular windows 4 for each waveguide portion 21 that form parts of wall of a vacuum chamber 1 such that a vacuum can be maintained in the vacuum chamber (column 5, line 15 to column 6, line 30).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use plurality of windows that also seal the vacuum chamber as taught by Mabuchi et al in the apparatus of Ishii et al avoid uneven dielectric heating of a larger window due to thermal strain (column 2, lines 5-25).

Regarding Claim 29: Ishii et al teach that slots 60 can be distributed in the waveguides 76 so as to cover the entire upper area of the processing chamber (column 11, lines 8-12).

Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ishii et al (US Patent No. 5,698,036) in view of in view of Mabuchi et al (5,645,644) as applied to Claim 24 and further in view of Mabuchi et al (US Patent No. 5,788,798).

Regarding Claim 26: Ishii et al in view of Mabuchi et al ('644) et al teach all limitations of the claim except distance between inner surfaces of adjacent waveguides.

Mabuchi et al ('798) teach an apparatus (Figure 8) that has adjacent waveguides 21a, 21b, separated by a metallic wall 30 and where the distance between the waveguides is not larger than the inner widths 213a, 213b of the waveguides (Column 6, lines 20-51).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use waveguides width configuration as taught by Mabuchi et al ('798) in the apparatus of Ishii et al in view of Mabuchi et al ('644) to maintain uniformity of plasma for large area substrates.

Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ishii et al (US Patent No. 5,698,036) in view of in view of Mabuchi et al (5,645,644) as applied to Claim 24 and further in view of Tadera et al (US patent No. 6,726,802).

Regarding Claim 30: Ishii et al in view of Mabuchi et al teach all limitations of the claim except plurality of windows to correspond commonly to the plural slots.

Tadera et al teach an apparatus (Figures 1, 2, 9) that has plurality of windows 11 that are hermetically arranged in a manner to correspond commonly to the plural slots (slot plate 4), and the vacuum condition is maintained between the plural electromagnetic wave radiation windows 11 and the vacuum chamber 2 (Column 4, line 52 to Column 5, line 5 and Column 8, lines 60-67).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use plurality of windows as taught by Tadera et al in the apparatus of Ishii et al in view of Mabuchi et al to maintain uniformity of plasma process for large area substrates.

Claims 31, 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishii et al (US Patent No. 5,698,036) in view of Mabuchi et al (5,645,644) as applied to Claim 24 and further in view of Mabuchi et al (JP Pub. No. 8-316198).

Regarding Claim 31: Ishii et al in view of Mabuchi et al ('644) teach all limitations of the claim except for length and width of windows.

Mabuchi et al ('198) teach an apparatus (Figure 5) that has rectangular waveguides 21a, 21b facing coupling windows 4a, 4b wherein the length, width and period of the window are substantially same as that of the waveguides. Mabuchi et al ('198) also teach that the major axis direction of the waveguides 21, 21b substantially coincides with that of the radiation windows 4a, 4b (Paragraph 0032, 0034).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use a radiation window having dimensions substantially equal to that of the waveguide as taught by Mabuchi et al ('198) in the apparatus of Ishii et al in view of Mabuchi et al ('644) to improve homogeneity of plasma propagation (Paragraphs 0014-0017).

Regarding Claim 32: Mabuchi et al ('644) teach an apparatus (Figures 2A, 3A) that has 4 windows 6 and dielectric (waveguide) 21 and the windows are smaller in length as compared to the waveguide (Column 6, lines 1 to 15 and Column 8, lines 1-8).

Claims 24, 25, 28, 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wu et al in view of Mabuchi et al (5,645,644).

Regarding Claims 24, 28, 29: Wu teaches a plasma apparatus (Figures 1, 4, 5) that comprises an electromagnetic wave source for generating electromagnetic waves, plural rectangular waveguides 3, a plurality of slots 14 formed in the rectangular waveguides and comprising a waveguide antenna, and a vacuum chamber 6, and configured such that a plasma is generated by the electromagnetic waves radiated from the slots into the vacuum chamber through the electromagnetic wave radiation window 9 (Figure 1), wherein:

the rectangular waveguides are linear waveguides, provided in contact with the vacuum chamber, and arranged such that the adjacent waveguides are in contact with each other at their elongated side faces;

the plasma processing apparatus includes a linear electromagnetic wave distributing waveguide 1 directly communicating with ends of the plural rectangular waveguides at a sidewall surface thereof along a longitudinal direction of the electromagnetic wave distributing waveguide 1, the distributing waveguide 1 having one end connected to the electromagnetic wave source, and distributing the electromagnetic waves from the electromagnetic wave source into the plural rectangular waveguides 3; and the electromagnetic wave radiation window 9 comprise part of a wall of the vacuum chamber such that a vacuum can be maintained in the vacuum chamber 6;

a transmission path of the electromagnetic waves is bent through substantially 90 degrees to the plurality of linear and rectangular waveguides 3 from the electromagnetic wave distributing waveguide 1; and

the electromagnetic wave distributing waveguide 1 and the plural rectangular waveguides 3 are arranged on substantially the same plane (column 5, lines 20-35).

Wu does not teach plurality of windows that comprise parts of a wall of the vacuum chamber 4 such that a vacuum can be maintained in the vacuum chamber.

Mabuchi et al teach a microwave plasma apparatus (Figures 2A, 2B) that includes a microwave source 24, a waveguide 23, a dielectric sheet 21 (like a distributing waveguide) and plurality of windows 4 that form parts of wall of a vacuum chamber 1 such that a vacuum can be maintained in the vacuum chamber (column 5, line 15 to column 6, line 30).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use plurality of windows that also seal the vacuum chamber as taught by Mabuchi et al in the apparatus of Wu to avoid uneven dielectric heating of a larger window due to thermal strain (column 2, lines 5-25).

Regarding Claim 25: Wu teaches al limitations of the claim as explained above and also that each of the plural waveguides is branched from an electric field plane of the electromagnetic wave distributing waveguide.

Wu does not teach plurality of rectangular windows provided on each rectangular waveguide that comprise part of a wall of the vacuum chamber 4 such that a vacuum can be maintained in the vacuum chamber.

Mabuchi et al teach a microwave plasma apparatus (Figures 2A, 2B) that includes a microwave source 24, a waveguide 23, a dielectric sheet 21 (like a distributing waveguide) and plurality of rectangular windows 4 for each waveguide portion 21 that form parts of wall of a vacuum chamber 1 such that a vacuum can be maintained in the vacuum chamber (column 5, line 15 to column 6, line 30).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use plurality of windows that also seal the vacuum chamber as taught by Mabuchi et al in the apparatus of Wu to avoid uneven dielectric heating of a larger window due to thermal strain (column 2, lines 5-25).

Claims 24, 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Naoki (JP 11-111493) in view of Ishii et al (US Patent No. 5,698036) and Mabuchi et al (5,645,644).

Regarding Claim 24: Naoki teaches a plasma processing apparatus (Figures 1, 2) for performing plasma processing, comprising an electromagnetic wave source 26 for generating electromagnetic waves, plural rectangle sections (like branched rectangular waveguides) 28a, a electromagnetic wave radiation window 4 made of dielectric material, and a vacuum chamber 1, and configured such that a plasma generated by the electromagnetic waves is radiated into the vacuum chamber through the electromagnetic wave radiation window 4, wherein:

the rectangular waveguides 28a are linear waveguides, provided in contact with the vacuum chamber, and arranged such that the adjacent waveguides are in contact with each other at their elongated side faces;

the plasma processing apparatus includes a linear rectangular waveguide tube (electromagnetic wave distributing waveguide) 23 directly communicating with ends of the plural rectangular waveguides, the distributing waveguide having one end connected to the electromagnetic wave source 26, and distributing the electromagnetic waves from the electromagnetic wave source into the plural rectangular waveguides; and the electromagnetic wave radiation window 4 comprises part of a wall of the vacuum chamber 1 such that a vacuum can be maintained in the vacuum chamber; a transmission path of the electromagnetic waves is bent through substantially 90 degrees to the plurality of linear and rectangular waveguides 28a from the electromagnetic wave distributing waveguide 23; and
the electromagnetic wave distributing waveguide 23 and the plural rectangular waveguides 28a are arranged on substantially the same plane (paragraphs 0024-0032).
Naoki does not teach plurality of windows that comprise parts of a wall of the vacuum chamber, plurality of slots in rectangular waveguides and that linear electromagnetic waveguide communicates with plural linear waveguides at a sidewall surface thereof along a longitudinal direction of the electromagnetic wave distributing waveguide.
Ishii et al teach a plasma processing apparatus (Figures 11-13) for performing plasma processing, comprising an electromagnetic wave source 50 for generating electromagnetic waves, plural branched rectangular waveguides 76, a plurality of slots 60 formed in the rectangular waveguides and comprising a waveguide antenna, a electromagnetic wave radiation window 48 made of quartz (dielectric material), and a vacuum chamber 4, and configured such that a plasma is generated by the

electromagnetic waves radiated from the slots into the vacuum chamber through the electromagnetic wave radiation window, wherein:

the rectangular waveguides 76 are linear waveguides, provided in contact with the vacuum chamber, and arranged such that the adjacent waveguides are in contact with each other at their elongated side faces;

the plasma processing apparatus includes a linear rectangular waveguide tube (electromagnetic wave distributing waveguide) 70 that directly communicating with ends of the plural rectangular waveguides at a sidewall surface thereof along a longitudinal direction.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use the configuration of wave distributing waveguide and the plural linear waveguides and plurality of slots in plural waveguides as taught by Ishii et al in the apparatus of Naoki to provide optimum transmission of microwave energy from the source to the process chamber.

Naoki in view of Ishii et al does not teach plurality of windows that comprise part of wall of wall of vacuum chamber such that vacuum can be maintained in the vacuum chamber.

Mabuchi et al teach a microwave plasma apparatus (Figures 2A, 2B) that includes a microwave source 24, a waveguide 23, a dielectric sheet 21 (like a distributing waveguide) and plurality of windows 4 that form parts of wall of a vacuum chamber 1 such that a vacuum can be maintained in the vacuum chamber (column 5, line 15 to column 6, line 30).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use plurality of windows that also seal the vacuum chamber as taught by Mabuchi et al in the apparatus of Naoki in view of Ishii et al to avoid uneven dielectric heating of a larger window due to thermal strain (column 2, lines 5-25).

Regarding Claim 25: Naoki teaches all limitations of the claim as explained above and also teach that each of the plural waveguides is branched from an electric field plane of the electromagnetic wave distributing waveguide.

Naoki does not teach plurality of rectangular windows provided on each rectangular waveguide that comprise part of a wall of the vacuum chamber 2 such that a vacuum can be maintained in the vacuum chamber, a plurality of slots 60 formed in the rectangular waveguides and comp rising a waveguide antenna and that linear electromagnetic waveguide communicates with plural linear waveguides at a sidewall surface thereof along a longitudinal direction of the electromagnetic wave distributing waveguide.

Ishii et al teach a plasma processing apparatus (Figures 11-13) for performing plasma processing, comprising an electromagnetic wave source 50 for generating electromagnetic waves, plural branched rectangular waveguides 76, a plurality of slots 60 formed in the rectangular waveguides and comprising a waveguide antenna, a electromagnetic wave radiation window 48 made of quartz (dielectric material), and a vacuum chamber 4, and configured such that a plasma is generated by the electromagnetic waves radiated from the slots into the vacuum chamber through the electromagnetic wave radiation window, wherein:

the rectangular waveguides 76 are linear waveguides, provided in contact with the vacuum chamber, and arranged such that the adjacent waveguides are in contact with each other at their elongated side faces;

the plasma processing apparatus includes a linear rectangular waveguide tube (electromagnetic wave distributing waveguide) 70 that directly communicating with ends of the plural rectangular waveguides at a sidewall surface thereof along a longitudinal direction.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use the configuration of wave distributing waveguide and the plural linear waveguides and plurality of slots in plural waveguides as taught by Ishii et al in the apparatus of Naoki to provide optimum transmission of microwave energy from the source to the process chamber.

Naoki in view of Ishii et al does not teach plurality of windows that comprise part of wall of wall of vacuum chamber such that vacuum can be maintained in the vacuum chamber.

Mabuchi et al teach a microwave plasma apparatus (Figures 2A, 2B) that includes a microwave source 24, a waveguide 23, a dielectric sheet 21 (like a distributing waveguide) and plurality of windows 4 that form parts of wall of a vacuum chamber 1 such that a vacuum can be maintained in the vacuum chamber (column 5, line 15 to column 6, line 30).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use plurality of windows that also seal the vacuum chamber as taught

by Mabuchi et al in the apparatus of Naoki in view of Ishii et al to avoid uneven dielectric heating of a larger window due to thermal strain (column 2, lines 5-25).

Claims 24, 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Naoki (JP 11-045799) in view of Ishii et al (US patent No. 5,698,036) and Mabuchi et al (5,645,644).

Regarding Claims 24: Naoki teaches a plasma processing apparatus (Figures 1, 2) for performing plasma processing, comprising an electromagnetic wave source 26 for generating electromagnetic waves, plural rectangle sections of partition plates (like branched rectangular waveguides) 314a, an electromagnetic wave radiation window 3 made of quartz (dielectric material), and a vacuum chamber 2, and configured such that a plasma generated by the electromagnetic waves is radiated into the vacuum chamber through the electromagnetic wave radiation window 3, wherein:

the rectangular waveguides 314 are linear waveguides, provided in contact with the vacuum chamber 2, and arranged such that the adjacent waveguides are in contact with each other at their elongated side faces;

the plasma processing apparatus includes a linear waveguide tube (electromagnetic wave distributing waveguide) 312 directly communicating with ends of the plural rectangular waveguides 314, the distributing waveguide 312 having one end connected to the electromagnetic wave source 26, and distributing the electromagnetic waves from the electromagnetic wave source into the plural rectangular waveguides; and the electromagnetic wave radiation window 3 comprises part of a wall of the vacuum chamber 2 such that a vacuum can be maintained in the vacuum chamber;

a transmission path of the electromagnetic waves is bent through substantially 90 degrees to the plurality of linear and rectangular waveguides 314 from the electromagnetic wave distributing waveguide 312; and

the electromagnetic wave distributing waveguide 312 and the plural rectangular waveguides 314 are arranged on substantially the same plane (paragraphs 0024-0032).

Naoki does not teach plurality of rectangular windows provided on each rectangular waveguide that comprise part of a wall of the vacuum chamber 2 such that a vacuum can be maintained in the vacuum chamber, a plurality of slots 60 formed in the rectangular waveguides and comprising a waveguide antenna and that linear electromagnetic waveguide communicates with plural linear waveguides at a sidewall surface thereof along a longitudinal direction of the electromagnetic wave distributing waveguide.

Ishii et al teach a plasma processing apparatus (Figures 11-13) for performing plasma processing, comprising an electromagnetic wave source 50 for generating electromagnetic waves, plural branched rectangular waveguides 76, a plurality of slots 60 formed in the rectangular waveguides and comprising a waveguide antenna, a electromagnetic wave radiation window 48 made of quartz (dielectric material), and a vacuum chamber 4, and configured such that a plasma is generated by the electromagnetic waves radiated from the slots into the vacuum chamber through the electromagnetic wave radiation window, wherein:

the rectangular waveguides 76 are linear waveguides, provided in contact with the vacuum chamber, and arranged such that the adjacent waveguides are in contact with each other at their elongated side faces;

the plasma processing apparatus includes a linear rectangular waveguide tube (electromagnetic wave distributing waveguide) 70 that directly communicating with ends of the plural rectangular waveguides at a sidewall surface thereof along a longitudinal direction.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use the configuration of wave distributing waveguide and the plural linear waveguides and plurality of slots in plural waveguides as taught by Ishii et al in the apparatus of Naoki to provide optimum transmission of microwave energy from the source to the process chamber.

Naoki in view of Ishii et al does not teach plurality of windows that comprise part of wall of wall of vacuum chamber such that vacuum can be maintained in the vacuum chamber.

Mabuchi et al teach a microwave plasma apparatus (Figures 2A, 2B) that includes a microwave source 24, a waveguide 23, a dielectric sheet 21 (like a distributing waveguide) and plurality of windows 4 that form parts of wall of a vacuum chamber 1 such that a vacuum can be maintained in the vacuum chamber (column 5, line 15 to column 6, line 30).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use plurality of windows that also seal the vacuum chamber as taught

by Mabuchi et al in the apparatus of Naoki in view of Ishii et al to avoid uneven dielectric heating of a larger window due to thermal strain (column 2, lines 5-25).

Regarding Claim 25: Naoki teaches all limitations of the claim as explained above and also teach each of the plural waveguides is branched from an electric field plane of the electromagnetic wave distributing waveguide.

Naoki do not teach plurality of rectangular windows provided on each rectangular waveguide that comprise part of a wall of the vacuum chamber 2 such that a vacuum can be maintained in the vacuum chamber, a plurality of slots 60 formed in the rectangular waveguides and comp rising a waveguide antenna and that linear electromagnetic waveguide communicates with plural linear waveguides at a sidewall surface thereof along a longitudinal direction of the electromagnetic wave distributing waveguide.

Ishii et al teach a plasma processing apparatus (Figures 11-13) for performing plasma processing, comprising an electromagnetic wave source 50 for generating electromagnetic waves, plural branched rectangular waveguides 76, a plurality of slots 60 formed in the rectangular waveguides and comprising a waveguide antenna, a electromagnetic wave radiation window 48 made of quartz (dielectric material), and a vacuum chamber 4, and configured such that a plasma is generated by the electromagnetic waves radiated from the slots into the vacuum chamber through the electromagnetic wave radiation window, wherein:

the rectangular waveguides 76 are linear waveguides, provided in contact with the vacuum chamber, and arranged such that the adjacent waveguides are in contact with each other at their elongated side faces;

the plasma processing apparatus includes a linear rectangular waveguide tube (electromagnetic wave distributing waveguide) 70 that directly communicating with ends of the plural rectangular waveguides at a sidewall surface thereof along a longitudinal direction.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use the configuration of wave distributing waveguide and the plural linear waveguides and plurality of slots in plural waveguides as taught by Ishii et al in the apparatus of Naoki to provide optimum transmission of microwave energy from the source to the process chamber.

Naoki in view of Ishii et al does not teach plurality of windows that comprise part of wall of wall of vacuum chamber such that vacuum can be maintained in the vacuum chamber.

Mabuchi et al teach a microwave plasma apparatus (Figures 2A, 2B) that includes a microwave source 24, a waveguide 23, a dielectric sheet 21 (like a distributing waveguide) and plurality of windows 4 that form parts of wall of a vacuum chamber 1 such that a vacuum can be maintained in the vacuum chamber (column 5, line 15 to column 6, line 30).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use plurality of windows that also seal the vacuum chamber as taught

by Mabuchi et al in the apparatus of Naoki in view of Ishii et al to avoid uneven dielectric heating of a larger window due to thermal strain (column 2, lines 5-25).

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rakesh K. Dhingra whose telephone number is (571)-272-5959. The examiner can normally be reached on 8:30 -6:00 (Monday - Friday).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571)-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Rakesh Dhingra

Parviz Hassanzadeh
Supervisory Patent Examiner
Art Unit 1763